ELECTICAL EQUIPMENT

• CONVEYOR FIELDBUS SYSTEM-AUSTDAC

• Console Port and Terminal Program User´s Manual

53-018-12

FMC Technologies Chile Ltda. Callao #2970 Oficina 704 Edificio Studio Las Condes Fono: 56-2-22320825

Title

CONSOLE PORT

AND TERMINAL PROGRAM

TYPE PCCATS

USER'S MANUAL

Document Number

53-018-12

Issue

04

REVISION CONTROL

04	ECO0016 Add software details for FTDI drivers	2010.12.20	PC	PC	PB’
03	Add MEAN1 information, Introduce PCCATS	2009.12.15	PB’	PB’	MC
02	Introduce console software, alter doc # 53-018-11 to 53-018-12	2009.08.10	PB’	PB’	MC
01	Original	2007.01.10	PC	PC	PB’
Issue	Details	Date	Written	Designed	Approved

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All Austdac products designed and manufactured since 2003, if microprocessor based, use the Texas Instruments MSP430 microprocessor family. This family of microprocessors has a number of serial ports; one of these serial ports has been made available to facilitate configuration, debugging or data capture. This dedicated serial port is known as the Console Port. Each product has a unique version of the PCCATS software running and waiting to receive a command from and transmit a response to a terminal or PC running a terminal program such as HyperTerminal. Each individual product presents a consistent easy to understand interface via the console port with standard and product specific commands that are listed in a help menu.

The Console Port and the PCCATS software allows the user a convenient method to configure, test, inspect and update the firmware of the target product. The console port of the target product is connected to a laptop via an intrinsically safe interface.

The hardware, connector, schematic and wiring details of the console port are described in Austdac document **53-010-11** titled ‘Product In-Circuit Programming (Bulk and Configuration) Specification’.

1 INTRINSIC SAFETY

The console port is more often than not part of a piece of electrical equipment that has been certified and marked as intrinsically safe. It is important that the explosion protection properties of this equipment be preserved by only connecting terminals, laptops and computers via an appropriate energy limiting interface. The Austdac interface type MEAN1 provides such energy limitation and has been certified as intrinsically safe associated apparatus as described in IEC/EN/AS/NZS 60079-0. Other types of interfaces should **not** be used with Austdac intrinsically safe product as the explosion protection properties of the product may be compromised by the unknown interface making the product unsafe for future use.

WARNING
The use of a console port interface other than an Austdac type MEAN1 will invalidate the explosion protection properties and certification of the host product to which it is connected.

2 SERIAL COMMUNICATIONS

The PCATS software communicates with the terminal or PC running a terminal program using standard serial non return to zero communications. The terminal or PC running a terminal program should be configured to operate at 19200 baud, 8 bits, one stop bit, no parity and no flow control.

If possible the terminal or terminal program should be further configured to emulate a DEC VT100 terminal to allow some Austdac products to use reverse highlighted text.

Most PC’s and laptops are produced without serial communications ports these days so the Austdac interface type MEAN1 was designed with an USB interface to allow it to be connected to the host PC running the terminal emulation program.

2.1 MEAN1 (FTDI) DRIVERS

It may be necessary to install the USB drivers for the MEAN1. The MEAN1 uses a FTDI IC. The Windows drivers (Windows operating system: Windows 2000, Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2) for this IC can be found at;

Austdac Server under Software_object_code\E181_MEAN1\CD (MEAN1) or,

http://www.ftdichip.com/Drivers/VCP.htm or,

on the CD with the folder CD (MEAN1) provided with the MEAN1.

Refer to your operating system instructions regarding how to install drivers.

3 TERMINAL EMULATION PROGRAMS

Many terminal emulation programs are available from various vendors and free from software download sites on the web. Austdac recommends Terminal® from Br@y++, MacWise® from Carnation Software and Hyper-Terminal® from Microsoft. MacWise® allows an Intel® based Apple® computer to emulate a terminal, HyperTerminal® is shipped with Windows® and Terminal® is available for download from the web.

3.1 HYPER-TERMINAL

Hyper-terminal is provided with Windows and can be found in the Accessories / Communications menu of the laptop or PC.

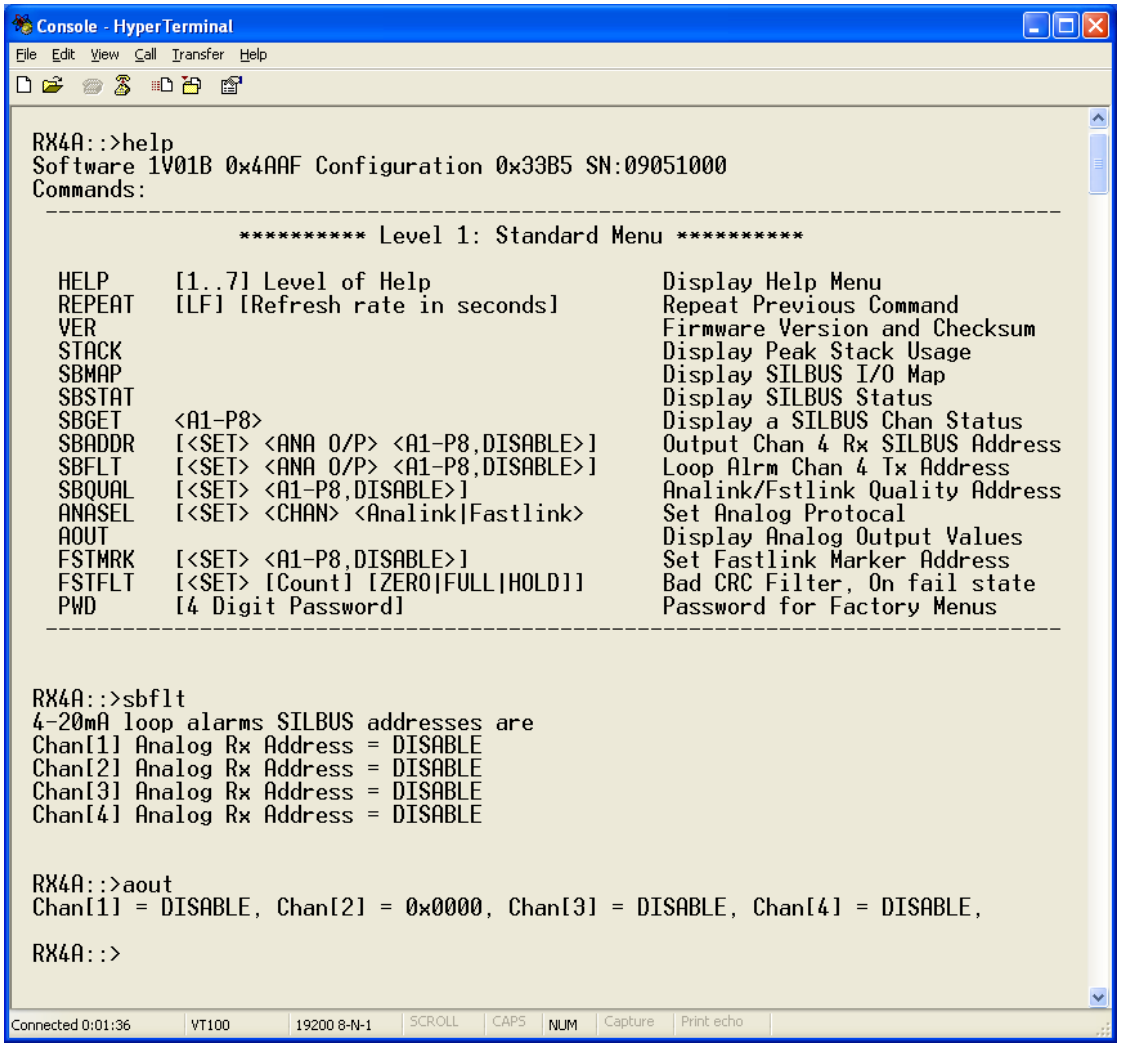

Figure 1 Screen shot of Hyper-terminal

3.2 TERMINAL

Terminal is a simple .exe program that simply needs to be copied into your desired directory or desktop and double clicking to start.

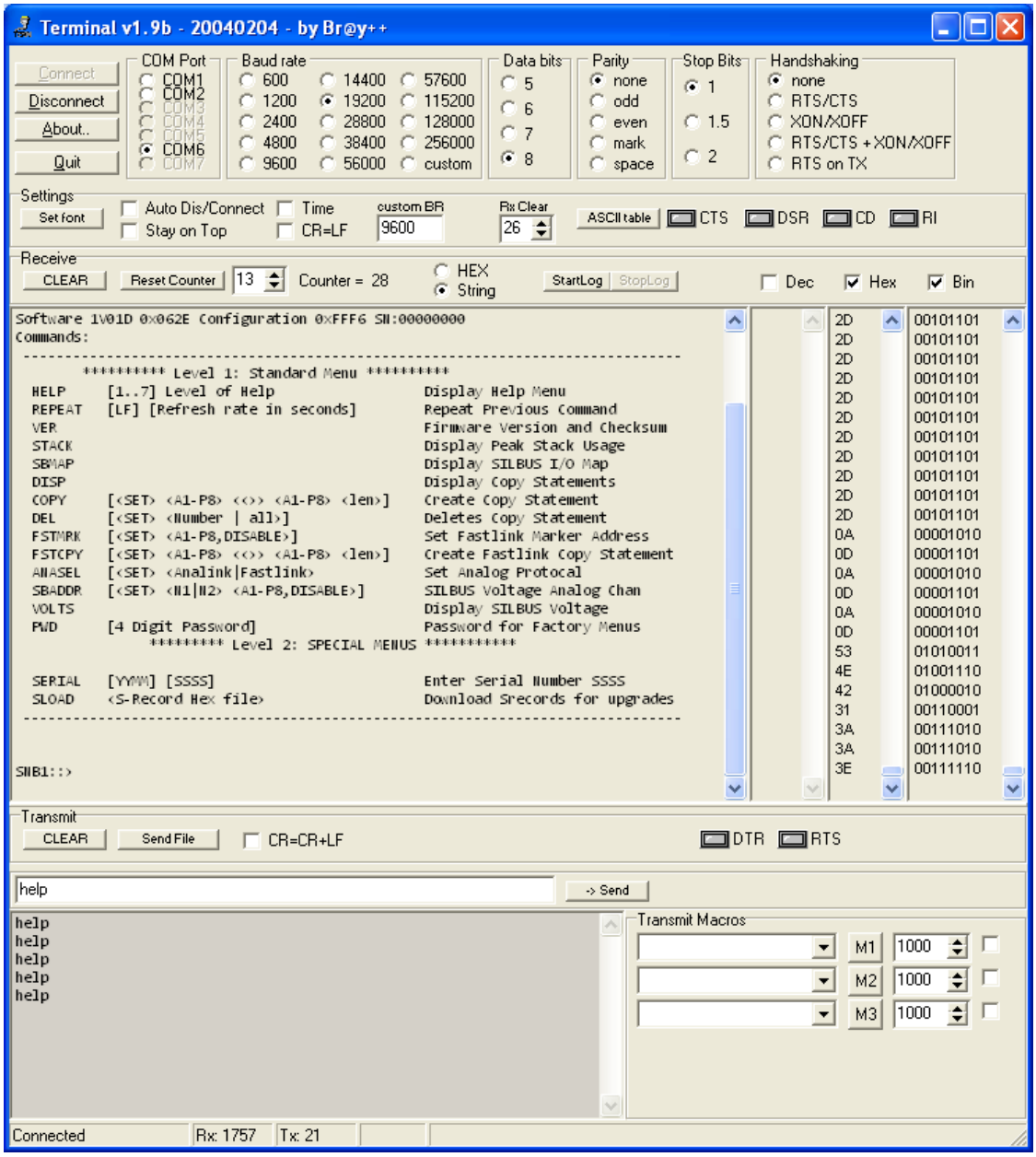

Figure 2 Screen shot of Terminal

3.3 MACWISE

An even better terminal emulation experience arriving soon.

4 CONSOLE PORT INTERFACE TYPE MEAN1

The console port interface type MEAN1 is a small grey box measuring mm(L) x mm(W) x mm(D) and is provided to allow a safe and compliant method of connecting the console port of an intrinsically safe product to a non-intrinsically safe laptop or PC. The interface also allows for level shifting and the supply of safe power to power the product or module for configuration when the product is not connected to a system or installation. The MEAN1 interface is connected to the laptop or PC via an USB cable.

Photograph 1 MEAN1 Interface with USB cable and console port cable

The MEAN1 interface is connected to the target product to be configured via a four way cable with Datamate connectors on both ends. The photograph below shows a typical connection between the interface and a target product.

Photograph 2 MEAN1 Interface connected to target product

The target cable is plugged into the four pin socket on the left end face of the interface. The three way RS485 cable and three way socket on the interface are not used in conjunction with the console port and PCCATS software.

4.1 TARGET POWER

The target product requires power when it is being configured using the interface and PCCATS software. This power can be provided in one of two ways, the first from the normal power input of the target product, the second via the MEAN1 interface. The normal power input of the target is typically used when the target is wired into the system and is receiving power from the system power supply. The power for the target can be supplied from the MEAN1 interface if the target is being configured away from its host system.

TARGET CONFIGURATION POWER		
TARGET CONFIGURATION POWER DERIVED FROM	MEAN1 CPP SWITCH	TARGET POWER SWITCH POSITION
SYSTEM POWER	OFF	RUN
MEAN1 INTERFACE	ON	PROG / CONFIG

Table 1 Target configuration power source details

Some products, for example the network bridge type SNB1, can only be configured when connected to the host system SILBUS network, as these devices derive power from the data network rather than from a power source. Other products that have an LCD and keypad are usually configured via that man-machine interface but may still have a console port for factory testing will always require system power for configuration.

4.2 INTERFACE FRONT PANEL LAYOUT

The MEAN1 interface front panel consists of two toggle switches and two green LEDs. The interface is shown in the photograph below:

Photograph 3 MEAN1 Interface front panel layout

4.2.1 CPP SWITCH

The Console Port Power switch is used to provide power to the target product when it is being configured standalone or when not connected to its host system. The power is provided via pin 1 of the console port connector. Console port power is available at pin 1 when the CPP switch is toggled towards the CPP text.

4.2.2 CONSOLE / MODBUS SWITCH

The MEAN1 interface can only use either the console port or the RS485 port but not at the same time. The CONSOLE / MODBUS switch is used to select the desired port. The CONSOLE / MODBUS switch should be toggled towards the CONSOLE text to select the console port or towards the MODBUS text to select the RS485 or MODBUS port.

4.2.3 TX LED

The green TX LED flashes whenever data is being transferred from the laptop or PC to the target product. This LED indicates data on the console port or RS485 port depending on the position of the CONSOLE / MODBUS switch.

4.2.4 RX LED

The green RX LED flashes whenever data is being transferred from the target product to the laptop or PC. This LED indicates data on the console port or RS485 port depending on the position of the CONSOLE / MODBUS switch.

4.3 TARGET CONNECTORS

The MEAN1 interface has two target connectors, a four pin console connector port and a three pin RS485 connector. The target connectors are shown in the photograph below:

Photograph 4 MEAN1 target connectors

The above photograph shows the four pin console connector on the left and the three pin RS485 connector on the right. Pin 1 is on the far left of each connector.

4.3.1 CONSOLE PORT CONNECTOR

The console port connector is used when configuring products that do not have a man-machine interface such as keypad and LCD.

CONSOLE PORT CONNECTOR PIN ASSIGNMENTS		
PIN	NAME	DESCRIPTION
1	Vcc	+3.3V POWER TO TARGET
2	TXD	TRANSMIT DATA TO TARGET
3	RXD	RECEIVE DATA FROM TARGET
4	Vss	0V OR COMMON

Table 2 Console port connector pin assignments

The TXD and RXD pins use 3.3 volt logic levels. The signals are asynchronous NRZ UART compliant.

4.3.2 RS485 MODBUS CONNECTOR

The three pin RS485 connector is used for testing and sniffing two full duplex MODBUS networks.

RS485 MODBUS CONNECTOR PIN ASSIGNMENTS		
PIN	NAME	DESCRIPTION
1	A+	RS485 SIGNAL
2	B-	RS485 COMPLIMENTARY SIGNAL
3	Vss	0V OR COMMON

Table 3 RS485 MODBUS connector pin asignments

The A+ and B- pins use 3.3 volt logic levels. The signals are differential complimentary asynchronous NRZ UART compliant.

5 ABREVIATIONS, CONVENTIONS AND SYMBOLS

The PCCATS software uses various symbols, abbreviations and conventions in its help menu and error messages. To help the end user these symbols, abbreviations and conventions are explained in the following paragraphs.

The PCCATS software uses a UNIX like command structure where the user types text commands after the PCCATS prompt followed by an ENTER or RETURN key. The PCCATS software responds with text showing the result of the command or an error message if the command failed. Some commands are just typed without optional parameters and PCCATS responds with the required information; others require optional parameters that will be used by the command to alter some aspect of the targets functionality. Commands that use optional parameters can be entered without these parameters to interrogate the target for the current settings before entering the command again with parameters to change the settings.

5.1 THE PROMPT

The PCCATS prompt is always of the same format and includes the type number of its host product, for example the SILBUS network bridge has the following prompt:

```
SNB1::>
```

The four channel analogue transmitter type SILBUS-TX4A has the following prompt:

```
TX4A::>
```

By having the type number of the target appear in the prompt the user can always determine and confirm which product they configuring or testing. A special purpose implementation of PCCATS is available with many MSP430 microprocessor peripheral control commands available. This implementation is identified by the following cursor:

```
BLANK::>
```

5.2 THE ENTER KEY SYMBOL

Throughout this manual and product manuals the ENTER or RETURN key is always shown by using the following symbol:

↵

Thus a prompt followed by a command string and ENTER key would shown in the following way:

```
TX4A::>VER↵
```

The above example shows the VERsion command being invoked on a four channel analogue transmitter module running PCCATS.

5.3 TYPICAL HELP DISPLAY

All instances of PCCATS have the HELP command implemented so that the user can simply obtain a full list of commands and there syntax by entering the HELP command. The following is a typical response to the HELP command:

```
RX4A::>HELP ↵

Software 1V01 0x4AAF Configuration 0x33DF SN:09031000
Commands:
------------------------------------------------------------------------
              ********** Level 1: Standard Menu **********

HELP       [1…7] Level of Help                    Displays Help Menu
REPEAT     [LF] [Refresh rate in seconds]  Repeats Previous Command
VER                          Displays Firmware Version and Checksum
STACK                                    Displays Peak Stack Usage
SBMAP                                      Displays SILBUS I/O Map
SBSTAT                                     Displays SILBUS Status
SBGET      <A1-P8>             Display selected SILBUS Channel State
SBADDR     [<SET> <ANA O/P> <A1-P8, DISABLE>]   Set ANA O/P Address
SBFALT     [<SET> <ANA O/P> <A1-P8 or DISABLE>]   Set Fault Address
SBQUAL     [<SET> <A1-P8, DISABLE>]    Analink/Fastlink Quality Add
ANASEL     [<SET> <ANA O/P> <ANALINK|FASTLINK>] Set Analog Protocol
AOUT                                 Display Analogue Output Values
PWD        <4 Digit Password>             Password for Factory Menus
------------------------------------------------------------------------

RX4A::>_
```

The actual commands are listed on the left followed by optional parameters and brief descriptions on the screen right.

5.4 THE OPTION SYMBOL

Commands that can accept optional parameters are shown in the help screen by the command followed by text between square brackets in the following format:

```
COMMAND    [optional parameters]
```

Everything inclosed within the square brackets is optional.

5.5 THE PARAMETER SYMBOL

Each parameter is enclosed by the parameter symbols < and >. Some commands may have one parameter others may have several parameters. Once one parameter has been entered then all parameters must be entered for the command to work without error. The following is an example of a command that has three parameters:

```
COMMAND [<parameter 1> <parameter 2> <parameter 3>]
```

All the parameters are optional but once the first parameter has been typed then the remaining parameters are no longer optional they must be entered. Parameters can be numbers, characters or a combination of these. Some parameters are restricted to a choice as shown for parameter 1 and parameter 3 in the following example:

```
COMMAND [<YES|NO> <parameter 2> <ON|OFF>]
```

5.6 THE CHOICE SYMBOL

Where a parameter is restricted to a choice of two, three or more keywords then the choices are separated by the choice symbol. The choice symbol is a | between the parameter choice keywords. The following example shows a parameter with three choices:

```
COMMAND [<LOW|MEDIUM|HIGH>
```

Some commands can have a choice of a variable value or a fixed condition as shown in the following example:

```
COMMAND [<A1-P8|DISABLE>]
```

6 CONSOLE PROGRAM (PCCATS)

The Console Program known as Product Configuration, Calibration and Test Software PCCATS resides in the target MSP430 processor and provides commands that allow the user to configure, test, upgrade firmware, calibrate and download data from the target product.

Some versions of PCATS allow the user to manipulate internal registers, ports and standard peripherals connected to the MSDP430 processor, but this is generally restricted to special applications. An understanding of the operation and functionality of the MSP430 processor family and connected peripherals is necessary to use this extended functionality of the console program.

The console port and program also provide a method of downloading new target firmware using the SLOAD command to allow for the upgrading or customisation of the target. This firmware update method will bypass the MSP430 security fuse in a secure way that protects the intellectual property of Austdac.

When first invoked, by pressing the **ENTER** key, the console program will output a screen similar to that shown in figure 3 below.

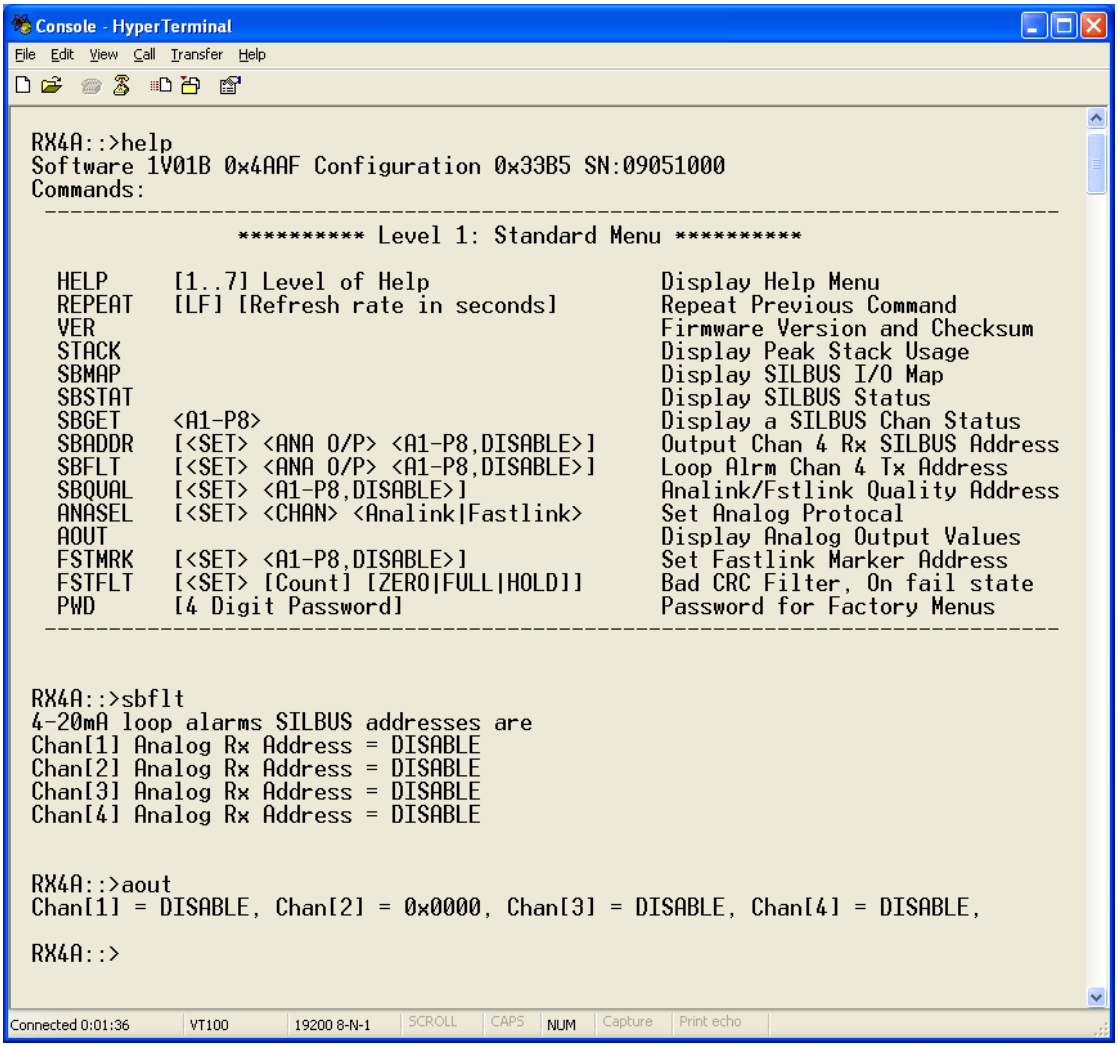

Figure 3 Typical screen showing HELP menu

The example shown in figure 3 only shows the SILBUS-RX4A implementation of the PCCATS software. The example is shown using the hyper-terminal program. Additional commands may be added in the future. The help screen or list of available commands can be displayed at any time by typing HELP at the prompt followed by the enter key.

The first line of the help display shows the software version followed by a checksum of the code in the MSP430 program memory (Flash) and the MSP430 configuration memory.

Refer to the target product user's manual for more detail on the implemented commands for the target product.

7 FIRMWARE UPGRADES

The firmware of each product can be updated or customised by uploading the new firmware into the product using the console port and the SLOAD command of PCCATS. The firmware update is stored in a .HEX file containing S records.

7.1 ‘S’ RECORD FILE FORMAT

The .HEX file containing S records can be viewed using Microsoft NOTEPAD® or similar pure text editor. An example of an S record .HEX file is shown below:

```
S00D0000436F64654865616465722E
S2140011003140000A3C4000023D401303B0127C17F9
S214001110B0123016B0124C170A120B120D4CB24019
S214001120805A20017C401100B012C0114F435E4F20
S2140011300E054E930724CD4E00001D535F537F903F
S2140011400500F52B3A433B402F00073CCD4E0000F0
S2140011501D533A433B400B0003430C4A0F4B3A5394
S2140011603B630CDF0C930924F2B040000200F42B22
S2140011705E4276007E900D00E923B012B8113D4025
S2140011800E054A433B40E8030E3CF2B04000020026
S2140011900A285E4276006A92032CCD4E00001D534C
S21400FFD0FFFFFFFFFFFFFFFFFFFFFFFFFF295EA3
S21400FFE0FFFFFFFFFFFFFFF281BFFFF4626FFFF69
S21400FFF076668C66FFFFFFFFFFFFFFFFFFF001B1D
S804001B00E0
```

Further information to be added when available.

8 SPECIFICATIONS

Software name ..... PCCATS

Baud rate 19200

Bits 8

Stop bits 1

Parity ..... None

Flow control ..... None

Preferred terminal emulation ..... DEC VT100

Interface type MEAN1

Interface to PC or laptop interface ..... USB